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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : A23L 1/31 — A1

(11) International Publication Number: WO 94/21143

(43) International Publication Date: 29 September 1994 (29.09.94)

(21) International Application Number: PCT/US94/02851

(22) International Filing Date: 16 March 1994 (16.03.94)

(30) Priority Data:
9305491.4 17 March 1993 (17.03.93) GB

(71) Applicant *(for all designated States except US)*: GRIFFITH LABORATORIES WORLDWIDE, INC. [US/US]; One Griffith Center, Alsip, IL 60658 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: BAUR, Joachim, N., C. [CA/CA]; 49 Foster Creek Drive, Newcastle, Ontario L1B 1G4 (CA). PINNOCK, Jill [CA/CA]; 7 Steele Home Court, R.R.#2, Bolton, Ontario 1 & E 5R8 (CA). DARLEY, Kenneth, S. [CA/CA]; 46 Farrow Crescent, Ajax, Ontario L1G 4W6 (CA).

(74) Agent: SUFRIN, Barry; Laff, Whitesel, Conte & Saret, 401 N. Michigan, Suite # 1700, Chicago, IL 60611 (US).

(81) Designated States: CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: FOOD PRODUCT GLAZE

(57) Abstract

A blend of starches, dextrins and gums with wheat flour and additional components, in defined levels, is used in a glaze composition to provide an improved crispy glaze on a food product. The additional components include combinations of protein with food grade acids and combinations of leavening agents, leavening acids and optionally calcium salts which impart a crunchiness and holding quality to the glaze. By choice of components the glaze may have an appearance from a colorless transparent glaze to an opaque golden brown glaze.

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FOOD PRODUCT GLAZE

BACKGROUND

The present invention relates to a glaze for raw, partially-cooked or fully-cooked food products intended to be re-heated or fully cooked for consumption which imparts crispness and crunchiness to the product and a retention of such textures after being held.

Many food products are distributed in a raw or partially-cooked, chilled or frozen form and are cooked to a fully-cooked form for consumption, often by frying, or other cooking methods. One such product is french-fried potatoes. A variety of cereal-based glazes have been applied, both seasoned and unseasoned, to such food products to provide a crispness to the product when cooked. However, such glazes generally are opaque, often are chewy and generally do not retain crispness when subjected to stress conditions such as food heating lamps, holding cabinets or steam tables.

There is therefore a need in the art for food-glaze compositions which provide a glaze to raw, par-fried or fully cooked and frozen or chilled foods which, following reheating or fully cooking for consumption will exhibit a desirable crispness and crunchiness without undesirable chewiness as well as a range of textures and also a retention of such properties following cooking when subjected to stress conditions on holding.

SUMMARY

The present invention provides a novel food product glaze, herein referred to as a "glaze", which may be formulated to be translucent and hence provide a more natural appearance to the food substrate to which it is applied. The glaze also may be formulated to be partially or wholly opaque, depending on the ingredients of the composition and their relative proportions, as described below.

The glaze provided herein imparts a unique combination of properties to the fully-cooked food

substrate bearing the glaze, including a desirable crispness and crunchiness and range of textures achieving such desirable properties under various cooking techniques such as frying, baking or microwaving. The desirable properties also are retained when the fully-cooked product is maintained at an edible temperature for subsequent consumption, for example, under a heating lamp, in a holding cabinet or on a steam table.

The present invention employs a blend of starches, dextrins and gums or other viscosity-building materials with wheat flour and one of two different combinations of other components to ensure that a unique interrupted glaze film is provided on the food substrate. This film is readily distinguishable organoleptically from the continuous film produced by conventional starch/dextrin polymers.

The other components referred to above will comprise either combinations of additional proteins and food grade acids (this embodiment is referred to as composition (A)), which tend to produce a glaze which has a more colored appearance and tender crisp texture, or combinations of leavening agents, leavening acids and optionally calcium salts (this embodiment is referred to as composition (B)), which tend to produce a glaze which has a less colored and harder crisp texture.

DESCRIPTION OF THE INVENTION

The first component of the compositions of the invention is wheat flour, which may be hard or soft. The wheat flour provides enrobing stability, diminished tackiness and stickiness and improved textural qualities. Preferably it is non-chlorinated. In general, the quantity of wheat flour present in the composition may vary from about 5 to about 50 wt%, and preferably from about 5 to 25 wt%. An increasing quantity of such flour leads to a more opaque product.

The next essential component is starch which may comprise a combination of a modified starch, preferably a modified corn-based or a modified potato-based starch, and rice or corn flour. The rice or corn flour may be in native or pregelatinized form. White corn flour is preferred to minimize color contribution from this component. For best results, approximately equal quantities of such starches are employed, although the relative proportions may vary. Other starches which may be present include an acid thinned corn starch, which provides improved textural qualities in some compositions. Quantities of such total starches based on the total composition weight for the embodiments of composition (A) and (B) may vary as set forth in the following Table I:

Table I

	General Range	Preferred Ranges (A)	Preferred Ranges (B)
Modified Corn-and/or Potato-based Starch	about 5 to 50 wt%	about 10 to 25 wt%	about 15 to 40 wt%*
Rice or Corn Flour	(A) about 2 to 25 wt% (B) about 5 to 50 wt%	about 2 to 15 wt%	about 10 to 40 wt%
Acid Thinned Starch	(A) about 5 to 50 wt% (B) 0 to 50 wt%	about 10 to 35 wt%	0 to about 35 wt%
Weight Ratio of Modified Starch to Rice or Corn Flour and Ratio of Modified Starch to Acid Thinned Starch	about 1:0.2 to 1:1 and about 1:0 to 1:3	about 1:1:1	about 1:1:1

* Preferably both corn and potato-based starch in a weight ratio of about 1:1

The weight ratio of wheat flour to total starch in composition (A) may vary from about 1:1 to 1:11 and preferably will be about 1:3. The weight ratio of wheat flour to total starch in composition (B) may vary from about 1:2 to 1:8 and preferably will be about 1:6.5.

A dextrin must also be present as a component of the compositions. Such dextrin may include, for example, a maltodextrin, a corn dextrin, a rice dextrin, or a tapioca dextrin. In general, dextrins with lower dextrose equivalent, particularly below about 1 and more particularly about 0, are preferred since they exhibit less tendency to brown when fried and lead to a greater fracturability of the glaze in the fully cooked product.

Quantities of dextrin based on the total weight of the compositions may vary from about 2 to 20 wt%, and preferably will be about 5 to 15 wt%. For best results in the case of composition (A), a proportion of dextrin approximating that of each of the starches is employed, although the relative proportions may vary. For composition (B), the preferred weight ratio of dextrin to total starch is about 1:5 to 1:15. The weight ratio of dextrin to total starch to wheat flour present in composition (A) generally varies from about 1:1 to 15:1 to 3 and preferably is about 1:3:1. For composition (B) the weight ratio is about 1:5 to 15:1 to 5 and preferably about 1:10:1.5.

A gum, such as xanthan gum or methylcellulose, is required in composition (A) and optional in composition (B) in order to better hydrate the starch, leading to improved product qualities, as well as providing enrobing stability. Relatively small quantities of gum are employed, generally from about 0.1 to 5 wt%, preferably about 0.1 to 2.5 wt% for composition (A) and preferably about 0.1 to 0.25 wt% for composition (B) if present, of the overall composition.

In the case of composition (A), it is preferred to include both xanthan gum and methylcellulose, preferably in a weight ratio of about 1:8. Also, other materials providing like viscosity-building effects may be employed in place of the gum, such as pregelatinized cereals, proteins and fiber.

The flour, starch, dextrin and gum components of the compositions are combined with water to form a glaze for application in a layer preferably less than about 2mm in thickness and most preferably less than about 1mm in thickness to a food substrate, typically french fries, but including any food substrate which can be coated and frozen, or coated, cooked, frozen or chilled and subsequently reheated or fully cooked by frying, baking or microwaving to an edible condition, or served at ambient temperature. The potential substrates thus include vegetables, fruit, nuts, meat, poultry, fish, seafood, dairy products and cereals. After the substrate is coated, it may be chilled, frozen or par- or fully-cooked. The compositions of the invention also may be employed as an outer glaze on a pre-coated food product.

Next, additional components are included comprising, in the case of composition (A), combinations of proteins and food-grade acids and, in the case of composition (B), combinations of leavening agents, leavening acids and optionally calcium salts. These additional components contribute significantly to the appearance, texture and keeping qualities of the final glazed product.

Among the ingredients of composition (A) and composition (B), the food grade or leavening acid provides a controlled color in the final product, which may vary from no color to a golden brown. The presence of additional protein in composition (A), such as soy protein, egg albumin, caseinate salts or whey protein, appears to break up the continuous nature of the film otherwise produced by the flour, starch, dextrin and gum

combination, leading to improved crispness and crunchiness and the desirable shortness of texture, both initially and on holding, exhibited by this invention. The quantity of additional protein which may be used in composition (A) may vary from about 2 to 20 wt%, and preferably will be about 2 to 10 wt%.

The food-grade acid interacts with the protein and the starches in composition (A) to provide increased crispness and crunchiness and a better retention of the textural properties under heating lamps or in a holding cabinet. Food-grade acids generally are present in an amount of about 0.1 to 2.5 wt% and preferably about 0.2 to 1.5 wt% of composition (A).

One particular food-grade acid which has been employed is citric acid which appears to contribute more to increased crispness and crunchiness on holding. Citric acid also has a pronounced effect on browning, decreasing color generation on cooking. Another particular food-grade acid which has been employed is monosodium phosphate which appears to contribute more to increased initial crispness and crunchiness. Accordingly, it is preferred to use a combination of citric acid and monosodium phosphate in composition (A). Such combination generally is employed in a weight ratio of citric acid to monosodium phosphate of about 1:1 to 1:3.

The same effects as provided by the combination of proteins and food grade acids in composition (A) can be achieved by utilizing leavening agents and acids in place of the additional protein, as in composition (B). Such materials enhance the textural characteristics of the glaze and have the added benefit of further decreasing the browning reaction, particularly at a lower dextrin and leavening alkali content which enables a glaze with very low or no color to be achieved, which may be desirable in certain applications.

The leavening agent may comprise a combination of chemicals which react together to form a gaseous material, which then causes the formation of a disrupted film on the food product. Such leavening agent generally comprises a food grade bicarbonate alkali, usually sodium bicarbonate, and a food grade leavening acid, usually sodium acid pyrophosphate (SAPP), which react together to form a leavening gas. The quantities of such chemicals used generally is sufficient to neutralize each other. In the combination of sodium bicarbonate and SAPP, the proportions employed are about 0.1 to 2.5 wt% and preferably about 0.5 to 1.3 wt%, for $NaHCO_3$, and about 0.1 to 3.5 wt%, preferably about 0.7 to 1.8 wt% for SAPP. Other reaction rate controlled acids such as sodium aluminum phosphate and monocalcium phosphate may be employed in combination with or independently of SAPP. Potassium bicarbonate or ammonium bicarbonate may be used as the alkali in combination with or independently of sodium bicarbonate.

The leavening agents generally are employed along with a reduced level of dextrin when it is desired to provide a less colored glaze. When higher dextrin levels are desired, leavening agents are reduced for a similar effect. Control of browning of the glaze also may be achieved by using heat-activated leavening acids as an additional component of the composition without significantly interfering with the leavening reaction. Useful heat-activated acids may comprise a combination of glucono-delta-lactone (GDL) and sodium aluminum phosphate. Such materials may be present in an amount of about 0.1 to 5.0 wt% and preferably about 0.5 to 2.0 wt%. They should generally be present in a weight ratio of about 1:1 to 1:3, and preferably at a ratio of about 1:2.

In addition, a calcium salt preferably will be present to provide improved properties to the glaze, by increasing glaze hardness, thereby contributing to

crunchiness, and by improving the holding qualities of the glaze. The calcium salt also serves to control the leavening activity of the acid component of the leavening agent and to decrease any off-flavour introduced particularly by SAPP.

Such calcium salt preferably comprises calcium lactate although other calcium salts, such as calcium phosphate and calcium sulphate may be employed. The calcium salt may be present in an amount of about 0.1 to 1.5 wt% and preferably about 0.2 to 0.6 wt%.

Flavorings may be included in the composition, depending on the food substrate to which the glaze is to be applied.

The dry mixture of components of the compositions are mixed with water generally in the weight ratio of 10 parts of solids to 7 to 20 parts water, and preferably about 10 parts solids to 10 to 14 parts water. Preferably, the resulting mixture is left to stand at temperatures of about 2 - 20°C and preferably about 5 - 15°C for a period of time sufficient to permit hydration of the starches, such as about 15 minutes. This provides improved texture over the non-fully hydrated material in terms of a shorter, crispier and crunchier glaze on the fully-cooked product, fresh or after holding. As an alternative procedure, the dry mixture of components can be applied in dry form to a moist substrate surface.

The coated food substrate then can be par-fried under suitable conditions to gelatinize the starch and form an interrupted, film-like glaze on the product. As mentioned above, such glaze may be transparent, partially opaque or opaque, depending on the quantity of wheat flour or starch which is present and the nature and quantity of the additional components present. A cooking time of about 15 to 90 secs., preferably about 30 secs., in an oil bath temperature of about 175 to 210°C, preferably about 190°C, is satisfactory in this respect.

The following examples illustrate various facets of the invention. It should be understood, however, that these examples are meant to be illustrative of the invention which is not intended to be limited thereto.

EXAMPLES

Example 1

This Example contains illustrations of composition (A).

Compositions were formulated from dry powdered materials in parts by weight as follows:

	(1)	(2)
Xanthan gum	0.5	0.25
Methylcellulose gum		2.0
Salt	15.0	15.0
Soft wheat flour	15.7	15.7
Modified corn starch	15.7	15.35
Acid thinned starch	15.7	15.35
Rice Flour	15.7	15.0
Maltodextrin	15.7	15.35
Soy protein concentrate	5.0	5.0
Citric acid	0.25	0.25
Anhydrous monosodium phosphate	0.75	0.75
	100.00	100.00

Following homogeneous blending of the dry components, the dry mixture was mixed with water in the weight ratio of 10:14.0 and left to stand for 15 mins. at about 13°C to effect hydration and produce a glaze having a viscosity (composition (1)) of about 18/22 seconds on Zahn No. 5 cup at 13°C or (composition (2)) of 620 to 700 cps on Brookfield Viscometer DMVII using Spindle 3 at 50 rpm. French fried potatoes were dipped in the glaze to be completely coated with glaze, excess glaze removed by air and then fried for 30 seconds at 190°C in cooking oil, before freezing. The french fries had a lightly-glazed appearance.

The par-fried, frozen french fries were subsequently cooked by frying in cooking oil at 175°C for 2¼ minutes. The fully-fried french fries exhibited a golden-brown color and were found to have a superior light, crisp and crunchy texture. Upon leaving the french fries to stand for 15 to 30 minutes under standard restaurant infrared heating lamps, the french fries were found to exhibit

similar textural properties as before exposure to the lamp, showing retention of the properties. Visual and textural characteristics differed as follows:

Composition (1) -- Exhibited a crisp, fracturable texture, a rough surface and a darker golden brown color.

Composition (2) -- Exhibited a tender crisp texture, a smoother surface and a light golden brown color.

Example 2

This Example contains illustrations of composition (B).

Compositions were formulated from dry powdered materials in parts by weight as follows:

	(3)	(4)	(5)
Sodium bicarbonate	1.3	0.7	1.0
SAPP	1.8	1.0	1.4
Calcium lactate	0.6	0.6	0.4
Salt	10.0	4.0	5.0
Soft wheat flour		7.5	8.0
Hard wheat flour	15.0	7.5	3.0
Modified corn starch	30.0	18	18
Modified potatoe starch (acelylated di-starch phosphate)		18	18
Tapioca Dextrin		2.5	2.5
White corn flour	34.3	36.2	36.1
Maltodextrin	5.0		
Hydrolyzed corn starch		2.5	5.0
Sodium aluminum phosphate	1.0	1.0	1.0
GDL	1.0	0.5	0.5
Xanthan gum			0.1
	100.0	100.0	100.0

The dry mixture was mixed with water in various weight ratios and left to stand for 15 mins. to effect hydration, the viscosity for which was determined using a Zahn No. 5 cup and a Brookfield viscometer, model DMVII, using spindle No. 4 at 20 rpm. The specific values obtained were:

Composition	Weight Ratio Dry Mix : H_2O	Viscosity Zahn No. 5	Viscosity Brookfield	Temperature of Glaze
(3)	(A) 10:11.0 (B) 10:11.5	(A) 25-30 sec. (B) 14 sec.	(A) 880 cps (B) 650 cps	(A) 17°C (B) 20.4°C
(4)	(A) 10:10.5 (B) 10:11.0	(A) 29-34 sec. (B) 15-16 sec.	(A) 960 cps (B) 600 cps	(A) 12°C (B) 12°C
(5)	10:13	16 to 17 sec.	600-700 cps	12°C

French fried potatoes were coated with these compositions using the procedure described in Example 1. Visual and textural characteristics differed as follows:

Composition (3) -- Exhibited a crispy, crunchy texture, a smooth surface and a light color.

Composition (4) -- Exhibited a crisp texture and an even smoother glaze and lighter color.

Composition (5) -- Exhibited a light crisp texture, smooth glaze and light color.

In the comparison of compositions (1) and (2) in Example 1, with (3), (4) and (5) in Example 2, both visual and textural differences were apparent. Example 1 compositions exhibited a more translucent surface, a darker color, a lightly coated but rougher surface and a more tender crisp and shorter textural quality. Example 2 compositions exhibited a more opaque surface, a lighter color, a non-distinct and smoother surface and a more pronounced and persistent crispy, crunchy texture.

While particular embodiments of the invention have been shown and described, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the spirit and scope of the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications which fall within the true spirit and scope of the invention.

WHAT WE CLAIM IS:

1. A composition for application to a food substrate as a glaze comprising:

from about 5 to 50 wt% of wheat flour;

a starch component comprising, based on the weight of the composition, about 5 - 50 wt% modified starch, about 2 - 25 wt% rice or corn flour and about 5 - 50 wt% acid thinned starch;

about 2 - 20 wt% dextrin;

about 0.1 - 5 wt% gum;

about 2 - 20 wt% added protein; and

about 0.1 - 2.5 wt% food grade acid.

2. The composition of claim 1 in which the wheat flour is present at a level of about 5 - 25 wt%.

3. The composition of claim 1 in which the wheat flour is non-chlorinated.

4. The composition of claim 1 in which the modified starch is a modified corn-based starch.

5. The composition of claim 1 in which the modified starch is a modified potato-based starch.

6. The composition of claim 1 in which corn flour is used and the corn flour is a white corn flour.

7. The composition of claim 1 in which the rice or corn flour is present at a level of about 2 - 15 wt%.

8. The composition of claim 1 in which the acid thinned starch is present at a level of about 10 to 35 wt%.

9. The composition of claim 1 in which the dextrin is chosen from the group consisting of maltodextrin, corn dextrin, rice dextrin and tapioca dextrin.

10. The composition of claim 1 in which 0.1 - 2.5 wt% gum is used.

11 The composition of claim 1 in which the gum is xanthan gum.

12. The composition of claim 1 in which the gum is methylcellulose.

13. The composition of claim 1 in which a combination of xanthan and methylcellulose gums are used in a weight ratio of xanthan gum to methylcellulose gum of about 1:8.

14. The composition of claim 1 in which an alternate viscosity-building material is substituted for the gum, said alternate viscosity-building material being chosen from the group consisting of pre-gelatinized cereals, proteins and fiber.

15. The composition of claim 1 in which the protein is present at a level of about 2 - 10 wt%.

16. The composition of claim 1 in which the protein is chosen from the group consisting of soy protein, egg albumin, caseinate salts and whey.

17. The composition of claim 1 in which the food grade acid is present at a level of about 0.2 - 1.5 wt%.

18. The composition of claim 1 in which the food grade acid is chosen from the group consisting of citric acid and monosodium phosphate.

19. The composition of claim 1 in which a combination of citric acid and monosodium phosphate are used in a weight ratio of about 1:1 - 1:3.

20. A composition for application to a food substrate as a glaze comprising:

from about 5 to 50 wt% of wheat flour;

a starch component comprising, based on the weight of the composition, about 5 - 50 wt% modified starch, about 5 - 50 wt% rice or corn flour and about 0 - 50 wt% acid thinned starch;

about 2 - 20 wt% dextrin;

about 0 - 5 wt% gum;

about 0.1 - 2.5 wt% of a food grade bicarbonate alkali; and

about 0.1 - 3.5 wt% of a leavening acid.

21. The composition of claim 20 in which the wheat flour is present at a level of about 5 - 25 wt%.

22. The composition of claim 20 in which the wheat flour is non-chlorinated.

23. The composition of claim 20 in which the modified starch is a modified corn-based starch.

24. The composition of claim 20 in which the modified starch is a modified potato-based starch.

25. The composition of claim 20 in which corn flour is used and the corn flour is a white corn flour.

26. The composition of claim 20 in which the rice or corn flour is present at a level of about 10 - 40 wt%.

27. The composition of claim 20 in which the acid thinned starch is present at a level of about 0 - 35 wt%.

28. The composition of claim 20 in which the dextrin is chosen from the group consisting of maltodextrin, corn dextrin, and tapioca dextrin.

29. The composition of claim 20 in which up to 2.5 wt% gum is used.

30. The composition of claim 20 in which the gum is xanthan gum.

31. The composition of claim 20 in which the gum is methylcellulose.

32. The composition of claim 20 in which an alternate viscosity-building material is substituted for the gum, said alternate viscosity-building material being chosen from the group consisting of pre-gelatinized cereals, proteins and fiber.

33. The composition of claim 20 in which the food grade bicarbonate alkali is present at a level of about 0.5 - 1.3 wt%.

34. The composition of claim 20 in which the food grade alkali is chosen from the group consisting of sodium bicarbonate, potassium bicarbonate and ammonium bicarbonate.

35. The composition of claim 20 in which the food grade alkali is sodium bicarbonate.

36. The composition of claim 20 in which the leavening acid is sodium acid pyrophosphate.

37. The composition of claim 20 in which the leavening acid is present at a level of about 0.7 - 1.8 wt%.

38. The composition of claim 20 in which the leavening acid is chosen from the group consisting of sodium acid pyrophosphate, sodium aluminum phosphate and monocalcium phosphate.

39. The composition of claim 20 including about 0.1 to 5 wt% of a heat-activated acid.

40. The composition of claim 39 in which the heat-activated acid comprises a combination of glucono-delta-lactone and sodium aluminum phosphate in a weight ratio of about 1:2.

41. The composition of claim 20 in which about 0.1 - 1.5 wt% of a calcium salt is included in the composition.

42. The composition of claim 41 in which 0.2 - 0.6 wt% of a calcium salt is included in the composition.

43. The composition of claim 41 in which the calcium salt is chosen from the group consisting of calcium lactate, calcium phosphate and calcium sulfate.

44. A food substrate coated with a glaze comprising:
from about 5 to 50 wt% of wheat flour;
a starch component comprising, based on the weight of the composition, about 5 - 50 wt% modified starch, about 2 - 25 wt% rice or corn flour and about 5 - 50 wt% acid thinned starch;
about 2 - 20 wt% dextrin;
about 0.1 - 5 wt% gum;
about 2 - 20 wt% added protein; and
about 0.1 - 2.5 wt% food grade acid.

45. The coated food substrate of claim 44 in which the substrate is french fries.

46. A food substrate coated with a glaze comprising:
from about 5 to 50 wt% of wheat flour;
a starch component comprising, based on the weight of the composition, about 5 - 50 wt% modified starch, about 5 - 50 wt% rice or corn flour and about 0 - 50 wt% acid thinned starch;
about 2 - 20 wt% dextrin;
about 0 - 5 wt% gum;
about 0.1 - 2.5 wt% of a food grade bicarbonate alkali; and
about 0.1 - 3.5 wt% of a leavening acid.

47. The coated food substrate of claim 46 in which the substrate is french fries.

48. The composition of claim 1 in which the dry components of the composition are combined with water and permitted to stand at a temperature of about 2 - 20°C for a period of time sufficient to permit hydration of the starches in the composition before application to a food substrate.

49. The coated food substrate of claim 48 in which the mixture of dry ingredients with water is permitted to stand about 15 minutes at a temperature of about 5 - 15°C.

50. The composition of claim 20 in which the dry components of the composition are combined with water and permitted to stand at a temperature of about 2 - 20°C for a period of time sufficient to permit hydration of the starches in the composition before application to a food substrate.

INTERNATIONAL SEARCH REPORT

Inte .tional application No.
PCT/US94/02851

A. CLASSIFICATION OF SUBJECT MATTER
IPC(5) :A23L 1/31
US CL :426/573
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 426/573,578, 589, 295, 296,92,302,303,652

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
APS
glaze/ coating with dextrin , starch, gum, protein,flour and acid

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,192,567 (VICKERS ET AL) 09 MARCH 1993, see entire document.	1-50
Y	US, A, 4,415,599 (BOS) 15 November 1983, see entire document.	1-50
A	US, A, 4,910,028 (BERNACCHI ET AL) 20 March 1990, see entire document.	1-50
Y	US, A, 4,948,608 (STYPULA ET AL) 14 August 1990, see cols. 8-22, Tables I and II, Examples and Claims.	1-50

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search 06 JUNE 1994	Date of mailing of the international search report JUN 15 1994
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer JEANETTE M. HUNTER Telephone No. (703 308-3849

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